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(*b*. Vienna, Austria, 1 June 1884; *d*. Chicago, Illinois, 28 November 1943)

*mathematics*.

Helly was the only son of Sigmund Helly, a civil servant, and of Sara Necker Helly. He and his sister, Anna grew up in a sheltered, middle-class home. Helly married Elise Bloch, a mathematician, on 4 July 1921; their only child, Walter Sigmund, became professor of operations research at the Polytechnic Institute of New York in Brooklyn.

Helly entered the Maximilians-Gymnasium in Vienna in 1894. Passing his final school examination in 1902; he then took up the study of mathematics, physics, and philosophy at the University of Vienna. Five years later he presented his (handwritten) dissertation, "Beiträge zur The ori der Fredholm'schen Integralgleichung," to the Department of Philosophy, receiving the doctorate on 15 March 1907 (the referees were Wilhelm Wirtinger and Franz Mertens). With the help of a fellowship, Helly then spent two semesters (winter of 1907 to 1908 and summer of 1908) at the University of Göttingen, studying primarily under David Hilbert, Felix Klein. Hermann Minkowski, and Carl Runge.

Upon his return to Vienna, Helly was confronted with the problem of earning a living. He began by giving private lessons in mathematics, and from 1910 on, he also taught at a gymnasium. In 1908 he became a member of the Viennese Mathematical Association (VMA), to which he delivered a total of seventeen lectures at its sessions.

Helly's first paper, "Über lineare Funktionaloperationen," appeared in 1912. His work basically consists of five items: his first work and "Über Systeme linearer Gleichungen…" rank as landmarks in the history of functional analysis; "Über Mengen konvexer Körper…" are concerned with his intersection theorem of convex analysis; and his paper "Über Reihenentwicklungen…" deals with several convergence criteria for a general class of orthogonal expansions.

Inspired by work of Friedrich Riesz, "Über lineare Funktionaloperationen" is a contribution to the moment problem that played a fundamental role in the development of functional analysis. Using the gliding hump method, Helly gave a first functional analytic proof of a particular case (linear functionals on the space of functions, continuous on a compact interval) of the uniform boundedness principle. Concerning the Hahn-Banach extension theorem, it is his proof, still used in today's courses, by which the matter is extended to one further and Öber…Mengen to be seen in connection with the particular case n = 1 of Helly's intersection theorem: A family of compact, convex sets of the *n*-dimensional euclidean space possesses a nonempty intersection provided *any n + 1* of the sets have a common element. Among the many important concepts and assertions developed in Helly's first work is his selection theorem, attributed to the foundations of real analysis and probability theory (see Wintner). Given a set of functions that are bounded and of bounded variation, both uniformly on a compact interval, one may select a subsequence that converges pointwise to a limit function of bounded variation.

In 1913 Helly presented his intersection theorem in a VMA lecture. Further projects he had announced were put aside with the outbreak of World War 1. Helly volunteered for the army in 1914, was called up in 1915, and was shot in the chest while serving on the Austrian-Russian front in September 1915, Subsequently taken prisoner, he was deported to eastern Siberia and not released until 1920.

Helly immediately resumed his studies, his goal being the *Habilitation*. Titles of two lectures he delivered at VMA meetings in 1914 ("Über unendliche Gleichungssysteme und lineare Funktionaloperationen": "Einiges Geometrische über den Raum von unendlich vielen Dimensionen") indicate that he had a concrete conception of his *Habilitationsschrift* even before the war. In fact, he presented his thesis, "Über Systeme linearer gleichungem," early in 1921 (the referee was Hans Hahn). Emphasizing connections with Minkowski's work. Helly studied general sequence spaces and included an axiomatic introduction of normed linear spaces that parallels the treatment s given by stefan Banach and Norbert Wiener (see Bernkopf, p. 67).

Helly was appointed *Privatdozent* at the University of Vienna in August 1921, remaining in this rank throughout his time in Vienna. Because the position was unpaid, he had to earn a living outside the university. From 1921 to 1929, he was employed in a bank; when it failed in 1929, he became an actuary at the Viennese life insurance company Phönix from 1930 to 1938. This may be the reason why Helly wrote only two further papers: his proof in 1923 of his intersection theorem and a long paper in 1930 in which he showed that the intersection theorem is a particular case of a general, purely topological theorem. (Recent concepts include Helly number, Helly space, and Helly hypergraph [graph theory].) In fact, entry 52A35 in *Subject Classification Scheme* 1979 of the American Mathematical Society is devoted to "Helly type theorems."

After the occupation of Austria in 1938, Helly could not teach the course he had announced for the summer semester; he also was dismissed by the insurance company because he was a Jew. In September 1938 the Hellys emigrated to the United States. The first years were difficult ones. Helly was a lecturer at several small colleges in New Jersey, even though he was recommended to more prominent schools by Oswald Veblen, Hermann Weyl, and Albert Einstein. But he was relatively old, had not held a "regular" university position in Europe, and was one of the many highly qualified immigrants seeking a position in the United States. His situation seemed to improve in September 1943, when he was appointed a visiting lecturer at the Illinois Institute of Technology in Chicago. He did not long enjoy this first more substantial university position; he died of heart failure two months later.

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